openreach

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Suppliers' Information Note

For The Openreach Network

BT Public Switched Telephone Network (PSTN):

Technical Characteristics Of The

Multi-Line Analogue Line Interface & Withdrawal Notification

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1. Scope

This Suppliers' Information Note (SIN) specifies the technical characteristics at the Network Termination Point (NTP) of the multi-line analogue interface of the Public Switched Telephone Network (PSTN) provided by Openreach. This is known commonly as a Multi-Line Group (MLG) line or a Private Branch Exchange (PBX) line.

In cases where the Network Termination Equipment (NTE) is mains powered, the conditions quoted in this SIN apply when mains power is being applied to the NTE. The conditions applicable when mains power is removed from the NTE may be different to those quoted in this SIN.

Much of the information contained in this SIN has been published previously in documents such as ETSI Standards and British Standards.

Changes to the network that affect the correct working of terminal equipment designed to use the Openreach PSTN will be published in Openreach SINs. If the changes impact on the content of this document then it will be updated.

SINs are available from our www site athttps://www.openreach.co.uk/orpg/home/helpandsupport/sins/sins.do . Enquiries relating to the technical content of this document and the availability of SINs should be directed to. orsinsfa@openreach.co.uk

Openreach will withdraw the PSTN multi-line analogue interface by the end of January 2027 in line with the closure of the BT UK PSTN.

2. The Network Termination Point

The Openreach network interface consists of two conductors designated as the ‘A’ and ‘B’ wires.

The Openreach network interface will be presented as one of the following:

a) solid copper conductors of diameter in the range 0.4 mm to 0.63 mm, or

b) equipment capable of terminating solid copper conductors of diameter in the range 0.4 mm to 0.63 mm.

c) via a BT Master socket (provided for Loop Calling Guarded Clear, on request).

d) via a Network Test and Termination Point (NTTP).

2.1. Insulation Displacement Connectors

When the Openreach network interface is terminated with insulation displacement connectors (IDC) they will accept the connection of solid copper conductors between 0.4 mm and 0.63 mm diameter.

2.2. Connections Used In BT Master Sockets

When the Openreach network interface is terminated on a BT Master Socket the connections are as shown in **Table 1**.

Table 1: BT Master Socket Contacts

1	Not Used for PSTN
2	‘A’ wire or ‘B’ wire
3	Local earth when required
4	Shunt connection, when required
5	‘B’ wire or ‘A’ wire
6	Not Used for PSTN

Note 1: The shunt connection is derived from the centre point between a 470 kΩ resistor and a 1.8 mF capacitor connected in series across the ‘A’ and ‘B’ wires. Additionally there is an over-voltage protection device connected across the ‘A’ and ‘B’ wires.

Note 2: Contact pin 6 is adjacent to the latch.

Note 3: Plugs which meet the requirements of BS 6312:Part 1:1994 [1] and wired to correspond with **Table 1** will be compatible with the BT provided socket.

2.2.1. Customer Wiring Connection

When the Openreach network interface is terminated on a BT Master Socket, the IDC connections for customer wiring are shown in **Table.2**.

Table 2: BT Master Socket IDC Connections for Customer Wiring

1	Not Used for PSTN
2	‘A’ wire or ‘B’ wire
3	Shunt connection (Bell wire)
4	Local Earth when required
5	‘B’ wire or ‘A’ wire
6	Not Used for PSTN

Note 1: The different types of NTE currently deployed within the Openreach network present from 3 to 6 IDCs for the termination of customer wiring, however, the essential connections, IDC '2', '3' & '5', will always be present and the numbering kept consistent.

Note 2: The numeric designation of IDCs and Master Socket contacts are not the same for each connection *(see Section 2.2.)*, for example, the 'shunt connection' is presented on IDC '3' and at Master Socket contact '4'.

3. Call Control Signalling Methods

The BT interface can be configured to support any one of the following signalling methods:

- i) earth calling
- ii) loop calling disconnect clearing
- iii) loop calling guarded clearing
- iv) loop calling unguarded clearing.

4. Line Conditions

4.1. Off-Line d.c. Condition

During the off-line state the Openreach network interface will provide the following conditions:

- The potential on the ‘B’ wire will not exceed -70V with respect to earth for earth calling signalling.
- The potential between the ‘A’ and ‘B’ wires will not exceed 70V for loop calling signalling.
- The ‘A’ wire will be positive with respect to the ‘B’ wire for loop calling provisions. The ‘A’ wire potential is ‘disconnected’ for earth calling provisions.
- The off-line d.c. voltage may not be continuous e.g. during routine line *testing (see Section 4.1.1. Line Test Conditions)* or during line testing in response to fault reports.
- The BT network interface will recognise a loop resistance of greater than 10 kΩ between the A and B wires for loop calling configurations, on the customer side of the NTP, as an off-line condition.
- The application of a condition which causes less than 4 mA to flow in the ‘B’ wire will be recognised as an off-line condition.
- There may not be a through metallic path from the Openreach network interface to the exchange so that the “battery” and “earth” at the exchange cannot be assumed to be repeated at the Openreach network interface.

4.1.1. Routine Testing

Automatic line testing routines are frequently carried out on Openreach lines. Details of the conditions to be found on Openreach lines during such events are to be found in SIN 351 [2].

4.2. On-Line d.c. Condition

During the on-line state the Openreach network interface will provide the following conditions:

- For loop calling provisions, the Openreach network interface will recognise a loop resistance of less than 1 kΩ between the 'A' and 'B' wires, on the customer side of the NTP, as an on-line ('seize') condition.
- For earth calling provisions, the Openreach network interface will recognise a resistance of between 300 Ω and 500 Ω applied between local earth and the 'B' wire, on the customer side of the NTP, as an on-line ('seize') condition.
- The d.c. current provided at the customer side of the NTP will be up to 42 mA at 12.5 V, up to 33.5 mA at 10 V, and will be not less than 25 mA at 9 V[1].
- Future designs of the line interface will aim to reduce the line current in the on-line state to improve the energy efficiency of Openreach's network equipment. Some of these line interfaces are already deployed on a relatively small scale and as a result the line current on these lines will become 25 mA in the on-line state for all the voltage values specified in this clause. The wider deployment of such line interfaces in the future will be considered by Openreach as the need or opportunity arises to replace or update existing equipment.

For most Openreach multi-line analogue network interfaces, and all those provided since October 1987, the d.c. conditions will continue to be met at the far end of customers' wiring attached to the interface where the loop resistance of this wiring does not exceed 250 Ω.

4.3. Line Polarity

The polarity of the Openreach network interface will normally be negative to the 'B' wire and earth to the 'A' wire. During call progress, once the call is 'answered', the polarity of the 'A' and 'B' wires will be reversed for the duration of the call.

4.4. Network Termination Impedance

4.4.1. Terminal Input Impedance

The impedance necessary to satisfactorily terminate the Openreach network interface at the NTP so as to prevent instability is represented by the three element network shown in **Figure 1**.

A minimum return loss of 12 dB should be achieved by terminal equipment against the three element network of **Figure 1**.

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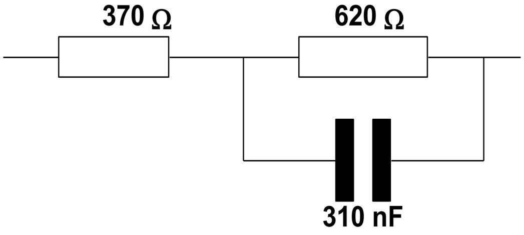
[1] These characteristics are aligned with those of ETS300 001, Chapter 2 Figure 2.3 (GB) [4].

Additionally for voice terminal equipment, an echo return loss value of 16 dB should be achieved against the three element network of **Figure 1**.

Figure 1: Terminal Complex Impedance Network



4.4.2. Network Input Impedance

The input impedance of the network at the NTP is represented by a range of impedances comprising the input impedance of the local exchange, modified by the impedance of a random variety of local cable types/characteristics.

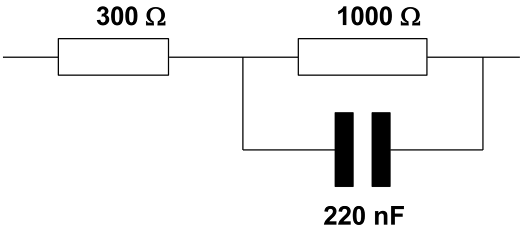
The nominal exchange input impedance is 300 Ω + 1000 Ω || 220 nF *(see **Figure** 2)*.

This may be regarded as the appropriate value for use by terminal designers.

The actual value of the exchange input impedance may vary due to production and installation tolerances, also the impact of terminal equipment connected at the far end of the circuit on the performance of circuits containing 4-wire loops. A worst case return loss of 16 dB against the three element network of **Figure 2** can be assumed.

The range of local lines can be represented by between 0 km and 5 km of 0.5 mm copper cable with nominal characteristics of 168 Ω/km and 50 nF/km (attenuation at 1600 Hz of 1.7 dB/km).

Figure 2: BT Network Complex Impedance Network



Openreach will provide a line with a maximum local access line loss of 8 dB *(see Section 10.6 Note 2)*.

5. Address Signalling Methods

The Openreach network interface will respond to address signalling information received from the terminal, either in Multi-Frequency Tone format or Loop Disconnect format.

5.1. Multi-Frequency Tone Signalling

The Openreach network interface will recognise tones meeting all of the following conditions as valid digits:

- multi-frequency tones conforming to **Table 3**, each digit being represented by simultaneous transmission of two frequencies e.g. digit 5 is indicated by 770 Hz + 1336 Hz, and
- combinations of the frequencies given in **Table 3** where the tolerance is within ± 1.5 % and the level is within -7 dBm to -13 dBm and with the high frequency at a higher level than the low frequency by between 1 dB and 4 dB, and
- tones that have been applied for a minimum period of 40 ms and with a minimum "tone off" period of 40 ms, and
- the level of any individual unwanted tone in the frequency band 300 Hz to 3,400 Hz has a power level of less than -33 dBm, and
- tones whose accompanying power level outside the frequency band 300 Hz to 3,400 Hz is less than -40 dBm, and
- tones whose accompanying total in-audio-band and out-audio-band unwanted tone power levels are 20 dB less than the lowest power level of any single digit tone.

Table 3: Digit Tone Frequencies

	Digits			Low
	1	2	3	*697 Hz*
	4	5	6	*770 Hz*
	7	8	9	*852 Hz*
	*	0	#	*941 Hz*
High	*1209*	*1336*	*1477*	

5.2. Loop Disconnect Signalling

The Openreach network interface will recognise as valid loop disconnect pulses meeting all of the following conditions:

- loop disconnect digits at the rate 10 ± 1 pulses per second where the ratio of the break period is 67 +5, -4 % of the overall pulse period, and
- Inter Digit Pauses greater than 240 ms and less than 920 ms, and
- a **break pulse** as a reduction in line current to less 500 mA for a minimum duration of 15 ms, and

- a **make pulse** with a minimum duration of greater than 5 ms, and
- with a pulse shape equivalent to that produced by the shaping circuit of 100 Ω in series with 1.8 μF when subjected to a voltage of between 1 V and 12.5 V.
  *(see **Figure** 3: Pulse Shaping Circuit).*

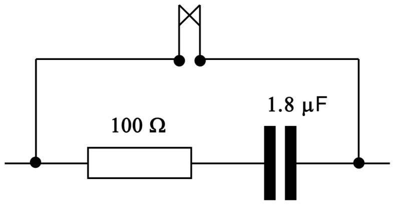


Figure 3: Pulse Shaping Circuit

6. OUTGOING CALLS

Once the Openreach interface has recognised a seize signal, the network indicates its readiness to receive routeing information by providing a Proceed Indication (Dial Tone) to the calling terminal.

6.1. Call Initiation

A terminal equipment on-line condition that persists for at least 10 ms will be recognised as a seize signal. After recognition of the seize signal by the Openreach interface, Proceed *Indication (see Section 6.2. Proceed Indication)* will be returned to the calling terminal within 500 ms.

6.2. Proceed Indication

When the Openreach network interface is ready to receive routeing information Proceed Indication (Dial Tone) will be provided to the calling terminal.

This tone is described in SIN 350 [3] Network Tones and Announcements.

6.3. Call Progress Information

During the progress of a call, a variety of tones and announcements may be encountered. Lists of these are to be found in SIN 350 [3] Network Tones and Announcements.

6.4. Post Dialling Delay

The call set-up time figures given below relate to calls routed wholly within the Openreach network. Calls that are routed outside the Openreach network (e.g. extended to mobile numbers, into private networks or via direct dialling in lines) may experience longer post dialling delays.

The mean value of call set-up time across the Openreach network is expected to be less than

3 seconds, when taking into account the differing levels of call complexity. In addition, 95% of calls are expected to be set up in less than 10 seconds.

6.5. Called Party Answer Signal

The called party answer signal is provided by the network on all outgoing calls to the caller when either:

a) the called party answers or

b) the network answers, e.g. after the access code to Other Licensed Operators for 2 stage calls.

The signal is a line reversal of the dc bias to the calling party for the duration of the call.

7. Incoming Calls

7.1. Call Arrival Indication

Where appropriate, the Openreach network interface will provide call arrival indication to any off-line terminal as shown in *Annex A: Call Arrival Indication (Ringing)*.

The voltage of the call arrival indication at the NTP will be between 100 V and 40 V a.c. r.m.s as measured between the 'A' wire and the 'B' wire. A Ringer Equivalence Number (REN - as defined in ETS 300 001, Chapter 3 Section 3.1 (GB) [4]) of 4 will be supported.

> Note. There is currently a relatively small scale deployment of a version of the line interface design that applies the a.c. call arrival indication voltage across the 'A' wire and 'B' wire, rather than across the 'B' wire and earth. The wider deployment of such line interfaces in the future will be considered by Openreach as the need or opportunity arises to replace or update existing equipment.

Call Arrival Indication may be presented with or without a d.c. voltage bias *(within the limits specified in Section 4.1. Off-line d.c. Condition)* on the 'A' wire, the 'B' wire, or both. When Call Arrival Indication is presented with a d.c. voltage, this voltage may be present during the whole cadence or may be confined to the silent periods. The polarity of this d.c. voltage may be reversed.

Call arrival indication is applied for up to 6 minutes or until the called customer answers.

7.2. Called Customer Answer

The Openreach network interface will recognise the application of an on-line d.c. condition that draws loop current as described in Section 4.2. as a called party answer, and disconnect ringing.

7.3. Ring Trip

In normal operation ringing current may continue to be applied for typically 110 ms to 510 ms after the on-line state is established.

8. Call Clearing

Note: Except where stated, the following call clearing conditions are written on the assumption that both ends of the call are connected to a single analogue line interface and the call is connected wholly within the Openreach network.

8.1. Terminal Initiated Clearing

8.1.1. By The Calling Terminal

When a call is ended by the calling terminal, the Openreach network interface will detect an off-line condition *(see Section 4.1. Off-Line d.c. Condition)* and provide the network initiated *clearing (see Section 8.2. Network Initiated Clearing)* to the called terminal. Line breaks of less than 200 ms will not be recognised as a clear. Line breaks greater than 3 s will be recognised as a clear *(see Section 11.1. Follow-on Call).*

8.1.2. By The Called Terminal

When a clear signal is received from the called terminal, the Openreach network interface will initiate a time-out process lasting between two and three seconds. After the time-out period has expired, network initiated clearing *(see Section 8.2. Network Initiated Clearing)* is provided to the calling terminal.

Calls which are made to certain services (e.g. Number translation services and Premium rate services) are subject to first party clearing. In these circumstances, when the called terminal ends the call there is no time-out process and the calling terminal is provided with network initiated clearing *(see Section 8.2. Network Initiated Clearing)* immediately.

8.2. Network Initiated Clearing

The Openreach network interface will provide a sequence of clearing signals at the NTP as a result of terminals ending a call or when terminals fail to present valid digits during call set-up.

This will consist of:

a) silence lasting approximately 3 s and,

b) for earth calling signalling, a 'disconnect clear timing' (DCT) signal with a value of 800 ms. After the DCT signal the interface will revert to battery on the B-wire and the A-wire remaining disconnected; or,

c) for loop calling disconnect clearing signalling, a DCT signal with a default value of 800* ms, after which the interface will revert to battery on the B-wire and earth on the A-wire. (* *This value can be changed by BT in accordance with customer CPE requirements between 0 ms and 1000 ms in 100 ms steps*); or,

d) for loop calling guarded clearing signalling a DCT signal with a value of 500 ms after which the interface will revert to battery on the B-wire and earth on the A-wire, then either;

e) direct to Parked State *(see Section 8.3. Parked State);* or

f) number unobtainable tone lasting approximately 40 s then Parked State.

(Number unobtainable tone is described in SIN 350 [3] Network Tones and Announcements).

Note 1: The DCT signal is sometimes known as the "K-break" signal. It offers a positive way for automatic terminal equipment to determine when either a calling terminal or the Openreach network interface has resumed the off-line condition. The signal consists of a disconnection or a reduction in the loop current to below 1 mA for the time period stated.

Note 2: Where the Openreach interface provides loop calling unguarded clearing signalling and is supported by non-copper access systems there may be no disconnect signalling available at the end of a call.

8.3. Parked State

When a terminal remains on-line, and has failed to offer a valid digit *(see Section 6.1. Call Initiation)* or has failed to achieve the off-line state after call clearing *(see Section 8. Call Clearing),* the Openreach network will monitor the line so that a terminal clear condition can be detected. In some circumstances an automatic howler might be applied *(see Section 10.4. Howler).*

9. Supervisory Signals

Supervisory signals provided at the Openreach network interface are described in SIN 350 [3] Network Tones and Announcements.

10. Additional Information

10.1. Transients

Change of line conditions (for example, polarity, voltage, speech band levels, feeding resistances, and current interruptions) may occur during processing of a call by the network.

10.2. Announcements

At various stages of calls it is possible for announcements to be connected. Announcements are described in SIN 350 [3] Network Tones and Announcements.

10.3. Noise, Induced Voltages And Line Surges

The Openreach network interface conditions described in this SIN are those encountered when there is no interference and the earth potential at the local exchange and the NTP is the same. In practice these conditions may be modified as follows.

Permanent longitudinal direct voltages up to 4 V may exist on the line.

Permanent longitudinal alternating voltages up to 5 V r.m.s. 50 Hz, and associated harmonics, may exist on the line. Additionally there may be an earth potential difference up to 3 V r.m.s. 50 Hz.

Permanent longitudinal and transverse alternating voltages, which generally do not exceed 3 V r.m.s., at other frequencies up to 2 MHz may exist on the line. These are generally noise voltages, but between 200 kHz and 2 MHz they may be amplitude modulated and be as a result of radio broadcast signals.

Uniform spectrum and random noise having a power of -42 dBm in the frequency range 300 Hz to 3400 Hz may exist on the line, with random impulsive noise in excess of -22 dBm. Also, other types of random transmission impairment may occur, such as interruptions, phase changes, phase jitter and gain changes.

10.4. Howler

Table 4: Howler Characteristics

Significance	Range of levels received at BT network interface	Signal composition	Cadence
To draw attention to a telephone left on-line. Howler may be applied to attachments which hold after the distant end has cleared or after an unsuccessful call. The howler can sometimes be applied automatically, in which case it will start 3 minutes after the parked state has been achieved.	Applied initially at mean power level of up to -8 dBm rising over 12 s to +15 dBm; total max. power +20 dBm.	Multi-audio frequency	Continuous for 3 minutes or until line release if this occurs first.

10.5. End-To-End Insertion Loss

The end to end insertion loss at 800 Hz between 600 Ω resistances terminating two Openreach network interfaces and routed wholly within the Openreach network is between 6 dB and 28 dB.

Note 1: These values apply only to calls where both ends are connected to analogue interfaces and the call is connected wholly within the Openreach network.

Note 2: Local line attenuation that exceeds 8 dB at 1600 Hz will be compensated within the local exchange so that the attenuation planning limit of 8 dB is not exceeded. However this does not compensate for the 'additional' loss/frequency distortion.

Note 3: If requested, a degree of automatic control of the network loss can be provided to partially compensate for the variation in local line loss. This automatic control may be required by some terminal equipment, such as PBXs that use line current to power extension apparatus.

10.6. Loss/Frequency Response

The loss/frequency response of Openreach's core network connecting its local exchanges conforms to ITU-T G.712 [5]: Figure 3.

Table 5: Core Network 2-wire to 2-wire Insertion Loss/Frequency Response

Frequency (Hz)	**10**	**200**	**300**	**400**	**600**	**2400**	**3000**	**3400**	**3600**	**4000**
Response (upper) (dB)	40	40	2	1.5	0.7	0.7	1.1	3	40	40
Response (lower) (dB)	0	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	0

Additionally, any connection will usually contain two local lines comprising a random variety of cable types/characteristics.

The nominal loss/frequency response limits of the range of local lines can be represented by between 1 km and 5 km of 0.5 mm copper cable with nominal characteristics of 168 Ω/km and 50 nF/km (attenuation at 1600 Hz of 1.7 dB/km) and are shown in **Table 6**.

Table 6: Local Network Cable Insertion Loss/Frequency Response

	Insertion Loss (dB)				
Frequency (Hz)	**200 Hz**	**400 Hz**	**1600 Hz**	**3200 Hz**	**4000 Hz**
Upper limit (dB)	2.5	3.6	7.2	10.2	11.4
Lower limit (dB)	0.4	0.6	1.2	1.7	1.9

Note 1: Values applicable to end to end characteristics apply only to calls connected wholly within the Openreach network when measured between 600 Ω resistances.

Note 2: Low Loss lines (3dB or 6 dB) are available at extra cost on request from BT. These line types guarantee the local loss of the line from the exchange to the NTP is a maximum of 3dB or 6 dB, as required. It is planned to withdraw this option on 31 December 2006.

10.7. Relative Group Delay

With the advent of the wholly digital core Openreach network, relative group delay has become less of a significant parameter in relation to the transmission of voiceband data.

10.8. Terminal Equipment Spectral Power Requirements

To prevent undue interference with other users of the Openreach access network, terminal equipment should conform to the requirements of the "Specification of the Access Network Frequency Plan (ANFP) applicable to transmission systems used on the Openreach Access Network". This ANFP specifies Power Spectral Density masks (PSD) defining the maximum power for each frequency that may be injected into the line at the customer end of the local loop. Customers are advised to contact their terminal equipment provider on this issue to ascertain the compliance of their terminal equipment with the ANFP. SIN 375 [6] gives up to date information about the ANFP PSD masks, and where to locate the latest issue of the ANFP specification.

If interference is caused to other users of the Openreach access network, and this is identified as resulting from terminal equipment being non-compliant with the ANFP, Openreach will be required to take remedial action to remove the cause of the interference. This could ultimately result in the disconnection of the PSTN circuit from the non-compliant terminal equipment.

Equipment that has been approved under the UK terminal equipment approval regime that existed prior to the implementation of the RE&TTE Directive [7], which is transposed into UK law by SI 2000 No. 730 [8] and SI 2003 No. 1903 [9], is deemed to be compliant with the ANFP.

10.9 Analogue Data Transmission

Information concerning successful data transmission over the PSTN is published in SIN 351[2] Annex B.

10.10. Supplementary Services

Supplementary Services for multi-line analogue line interfaces are described in SIN 354[10] Supplementary Services available on the Analogue Line Interface, Annex B.

10.11 Follow-On Call

To initiate a follow-on call the Openreach network interface will recognise a break in the loop current applied at the NTP, where the d.c. current falls to 1 mA or less for a time period in excess of 3 s.

11. Glossary

ANFP	Access Network Frequency Plan
CPE	Customer Premises Equipment
DCT	Disconnect Clear Timing
EMC	Electro-Magnetic Compatibility
ETS	European Telecommunication Standard
ETSI	European Telecommunications Standards Institute
IDC	Insulation Displacement Connector
ITU-T	International Telecommunication Union For Telecommunications
MLG	Multi-Line Group
NTE	Network Termination Equipment
NTP	Network Termination Point
NTTP	Network Test and Termination Point
PBX	Private Branch Exchange
PSD	Power Spectral Density
PSTN	Public Switched Telephone Network
RE&TTE	Radio Equipment and Telecommunications Terminal Equipment
SI	Statutory Instrument
SIN	Suppliers' Information Note
TE	Terminal Equipment
TIG	Technical Interface Guide

12. References

[1]	British Standards document BS6312, 1994 - Connectors for analogue telecommunication interfaces. Part 1. Specification for plugs.
[2]	SIN 351 - BT Public Switched Telephone Network (PSTN): Technical Characteristics Of The Single Analogue Line Interface.
[3]	SIN 350 - BT Public Switched Telephone Network (PSTN): Network Tones And Announcements.
[4]	ETSI ETS 300 001, 4th Edition January 1997. Attachments to Public Switched Telephone Network (PSTN); General technical requirements for equipment connected to an analogue subscriber interface in the PSTN.
[5]	ITU-T Recommendation G.712, 11/96 - Transmission performance characteristics of pulse code modulation channels.
[6]	SIN 375 – Terminal Equipment Spectral Power Requirements.

[7]	RE&TTE Directive - Directive 1999/5/EC of the European Parliament and of The Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity, OJ L91, 7.4.1999, p.10.
[8]	Statutory Instrument 2000 No. 730. The Radio Equipment and Telecommunications Terminal Equipment Regulations 2000.
[9]	Statutory Instrument 2003 No. 1903. The Radio Equipment and Telecommunications Terminal Equipment (Amendment) Regulations 2003
[10]	SIN 354 - BT Public Switched Telephone Network (PSTN):Technical Characteristics of The Supplementary Services Available On The Analogue Line Interface.

For further information or copies of referenced sources, please see document sources at.

https://www.openreach.co.uk/orpg/home/helpandsupport/sins/sins.do

13. History

TIG 2 Issue 1	October 1997	Document published as a Technical Information Guide.
TIG 2 Issue 2	October 1998	Major revision.
SIN 352 Issue 1.0	April 2001	Document re-issued as SIN 352, with editorial changes. '± 1.5 Hz' corrected to '± 1.5 %' in Section 5.1. IDC allocation for extension wiring added.
SIN 352 Issue 2.0	May 2002	Editorial changes. Annex B amended to add minimum 2400 bit/s data rate Clause 2.1 Note 1, “GDT” changed to “over-voltage protection device” Clause 4.1, conditions added concerning absence of continuous voltage and through metallic path. Clause 10.8 added referencing the ANFP.
SIN 352 Issue 2.1	March 2003	Clause 10.8 ‘TE Spectral Power Requirements’ – Reference to the RE&TTE Directive, SI No. 730/2000, and SIN 375 added. Annex B text relating to minimum data rate amended.
SIN 352 Issue 2.2	February 2005	Editorial changes. Annex on Analogue Data Transmission replaced by reference to SIN 351. Correction to timing characteristics for MF Tone Signalling digit recognition in 5.1. Information added to 4.2 that line current provided by

		new designs of interface will tend towards 25 mA. Changes to 7.1 to clarify call arrival characteristics.
SIN 352 Issue 2.3	January 2006	Clause 4.2 (On-Line d.c. Condition) updated. Note added to 7.1 (Call Arrival Indication). Reference to UK National Transmission Plan added to Appendix C. Notice of withdrawal of Low Loss lines option given in 10.6.
SIN 352 Issue 2.4	March 2006	35 mA earth calling seize text removed from 4.2.
SIN 352 Issue 2.5	April 2014	Update to section 8.1.2 – 'a timeout process lasting between two and 3 minutes' changed to 'between 2 *seconds* and 3 minutes'. Editorial changes Change SINet site references from http://www.sinet.bt.com to http://www.btplc.com/sinet/
SIN 352 Issue 2.6	June 2016	Further update to section 8.1.2. Time out process changed from 'between 2 seconds and 3 minutes' to 'between 2 and 3 seconds'
SIN 352 Issue 2.7	June 2018	Changed reference [5] to point to ETSI ETS 300 001 as BS6305 has been withdrawn. Consequential wording change to the footnote referenced from section 4.1 and the text in section 7.1 to refer to relevant sections of ETS 300 001.
SIN 352 Issue 2.8	July 2019	Made the following changes to Section 2:- 1. Deleted reference to BSI DISC PD1002 as this publication is no longer available. 2. Added a Network Test and Termination Point (NTTP) as one of the BT interface line presentations.
Issue 2.9	September 2020	Changes to branding, from BT to Openreach including changes to reflect new Openreach SIN site and Openreach SIN email address
Issue 2.9	September 2021	Annual Review – no changes required – issue remains unchanged.
Issue 2.9	October 2022	Annual Review – branding and font changes only – issue remains unchanged.
Issue 2.9	October 2023	Annual Review – branding and font changes only – issue remains unchanged.

Issue 3.0	January 2025	Service Withdrawal notification added to Section 1.

Annex A: Call Arrival Indication (Ringing)

Significance	Signal frequency	Cadence (± 10 %)
1) Standard Ringing	25 Hz +1 Hz, -5 Hz	0.4 s on 0.2 s off 0.4 s on 2 s off

Note 1: Cadence does not necessarily coincide with ring tone cadence.

Note 2: Suppliers should ensure that devices will not be adversely affected should ringing be applied to them.

Note 3: A d.c. voltage (within the limits specified in Section 4.1. Off-line d.c. Condition) may be present during the whole cadence or may be confined to silent periods.

Annex B: Further Sources Of Related Information

BS 6450 : Part 1	Private Branch Exchanges for connection to public switched telephone networks (PSTN) run by certain public telecommunications operators. Part 1. Specification for general requirements.	1993
BSI PD 7002	Essential requirements for connection of terminal equipment to 2-wire analogue interfaces, without capacitive termination, of public switched telecommunication networks using either the earth calling, the loop calling-disconnect clearing, the loop calling-guarded clearing or the loop calling-unguarded clearing signalling method.	1996

A number of BT SINs are useful in providing background information about the BT network interface.

SIN 227	CDSÔ Calling Line Identification Service - Service description.
SIN 242	CDSÔ Calling Line Identification Service. TE Requirements Part 1 Idle State, Down Stream Signalling, Part 2 Loop State signalling.
SIN 367	Characteristics of the BT Network: Electrical Safety & EMC.

Guidance on one-way transmission delay can be found in the Recommended Standard for the UK National Transmission Plan for Public Networks, ND1701. This is published by the Network Interoperability Consultative Committee.

For copies of referenced sources, please see document sources at http://www.btplc.com/sinet/DocumentsSource/index.htm

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